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Sheahan, Catherine Gertrude

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Analysis of an addition drill plan
in an arithmetic text.

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Thesis

ANALYSIS OF AN ADDITION DRILL PLAN IN AN ARITHMETIC TEXT

Submitted by

Catherine Gertrude Sheahan
(B. S., School of Education, 1929)

In partial fulfillment of requirements for the

degree of Master of Education

1930

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School of Education
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TABLE OF CONTENTS

Introduction	Page 2
Explanation of the Tables	Page 4
The Study	Page 9
The Summary	Page 86
The Bibliography	Page 94

INTRODUCTION

This study is a unit in the larger problem which has for its object the securing of 100% accuracy in the fundamentals of arithmetic. Those who have followed the splendid work of the School of Education along this line carried forward throughout New England for the last four or five years under the inspirational leadership of Dr. Wilson, have been given proof that this most desirable goal, namely, 100% accuracy far from being unattainable is, instead, an aim that can readily be accomplished if only the teaching is correct. This demands a well planned drill service.

Every author of an arithmetic text undoubtedly believes, or at least would have us believe, that he has found the best scheme, has formulated the best drill service in aiding teachers and pupils alike in attaining this worthwhile objective, namely, 100% accuracy. But all too frequently in the past textbooks have given no attention to sequence or sizable units and directly had children up against combinations not known and process difficulties not previously explained. As Wilson, Judd, and Buswell have suggested it would seem reasonable to expect authors and publishers of new texts to make available data verifying the merits asserted to be peculiar to their products. In the absence of such information the only way to know the true worth of a given text is through making an intricate analysis of such a book. Such an analysis necessitates the working out of every addition example and problem and noting the various combinations used. Furthermore to give the author the benefit of any doubt the addition facts used in proving subtraction, in carrying in multiplication, and in adding partial products in multiplication all must be accounted for. The combinations must then be properly tabulated so as to show the author's teaching groups, his process steps, and his drill on primary and decade facts. The results of such an analysis should disclose the relative efficiency of the drill service under

examination, at least, so far as effected by these items.

Within the last five years in the School of Education several textbooks have been analyzed. Among them are the following:

1. The Iroquois Arithmetic Book I published by the Iroquois Publishing Co., Syracuse, N. Y., 1927.

2. The Strayer Upton Arithmetic Book I published by the American Book Co., N. Y., 1928.

3. 100% Accuracy in the Fundamentals of Arithmetic by G. M. Wilson published by the University Publishing Company, N. Y., 1928.

The study of the latter two texts mentioned was made by R. W. T. Barclay while the Iroquois Analysis was made by Miss Rebecca Parsons to whom we are indebted for the form of the tables.

This present study contributes the analysis of The Modern Life Arithmetic Book I by J. G. Fowlkes & T. T. Goff, published by the Macmillan Company, 1928.

The various comparisons between this text and those previously analyzed as outlined in the summary should be a help in aiding the teacher to choose a worthwhile arithmetic text.

EXPLANATION OF THE TABLES

There are three separate tables used throughout this analysis. Each table is carried forward by sections and finally accumulated in the summary table.

The first table which is numbered I and IV in the respective drill analyses is called the teaching table. It has three parts as follows:

Part "A"

> This part shows the primary teaching combinations. The figures in red indicate the new teaching combinations and those in black indicate the combinations which have been previously taught. These combinations are read from the bottom up in each case as 3 + 4 would be written in the table $\overset{4}{\underline{3}}$. In order to make this part of the table clearer Table I, Sample, page.7..has been put in and the following combinations plotted: 0 + 2   3 + 4. Turning to the sample page it will be observed that there is a black figure 2 over a zero. This is the combination 0 + 2 because it is read from bottom up. The figure 2 is in black which indicates that this combination has been taught in a previous teaching group. Further down on the table a red figure 4 can be seen over the figure 3. This is the second combination: 3 + 4. It will be noted that the red figure 3 indicates that this is a new combination and is being taught in the present teaching group.

[illegible]

The [illegible] analysis. Each [illegible] and finally [illegible]

table.

The first table [illegible] 1 and 2. [illegible] as follows:

[illegible]

This [illegible]

Part "B"

This part shows the decade combinations taught up to 39 - 9 inclusive. The numbers in red indicate the new combinations that are being taught in the present teaching group. The numbers in black indicate the combinations that have been taught in the previous teaching groups. The following combinations have been plotted: 10 + 1, 12 + 5. Turning to the sample table part "B" on page .7.. it will be noticed that there is a black figure 1 opposite the figure 10 under the figure 1. This is the combination 10 + 1 because this section is read from left to top. The black 1 indicates that this combination has been taught previously. Further down it will be observed that there is a red 5 in the square opposite the figure 12 and under the figure 5. The red figure indicates that the combination is being taught in the present teaching step.

Part "C"

This part really is a continuation of part "B" and is read in the same way. It contains only the combinations beyond 39 + 9 that are needed in carrying in multiplication. Instead of figures black and red crosses are used to mark the facts taught in this group.

The second table which is numbered II and V in the respective drill analyses is called the frequency table or tabulation table. It has three parts as follows:

Part "A"

This table is read from left to top like the "B" and "C" parts of the teaching table. The figures in each square indicate the

frequency that the combination represented by that square has been used in the drill service. In order to make the frequency number clearer, Table II, Sample, page .8.. has been put in and the following plotted: 2 - 3 frequency of 19. 4 - 6 frequency of 30.

Turning to this sample table on page .8.. it will be noted that opposite the figure two on the left hand side of the table and under the figure three at the top of the table there is a square that represents the combination 2 + 3. The figure 19 in this square indicates that the combination 2 + 3 has been used that many times in the drill work of this teaching group.

If we do the same with the combination 4 + 6 it will be noted that it has been used 30 different times in the drill work covered by this table.

Part "B"

This part is really a continuation of part "A" and is tabulated in the very same way. It covers the decade combinations up to 39 + 9.

Part "C"

This part is a continuation of part "B" and is tabulated in like manner. It covers the decade combinations above 39 + 9 that are needed in carrying in multiplication.

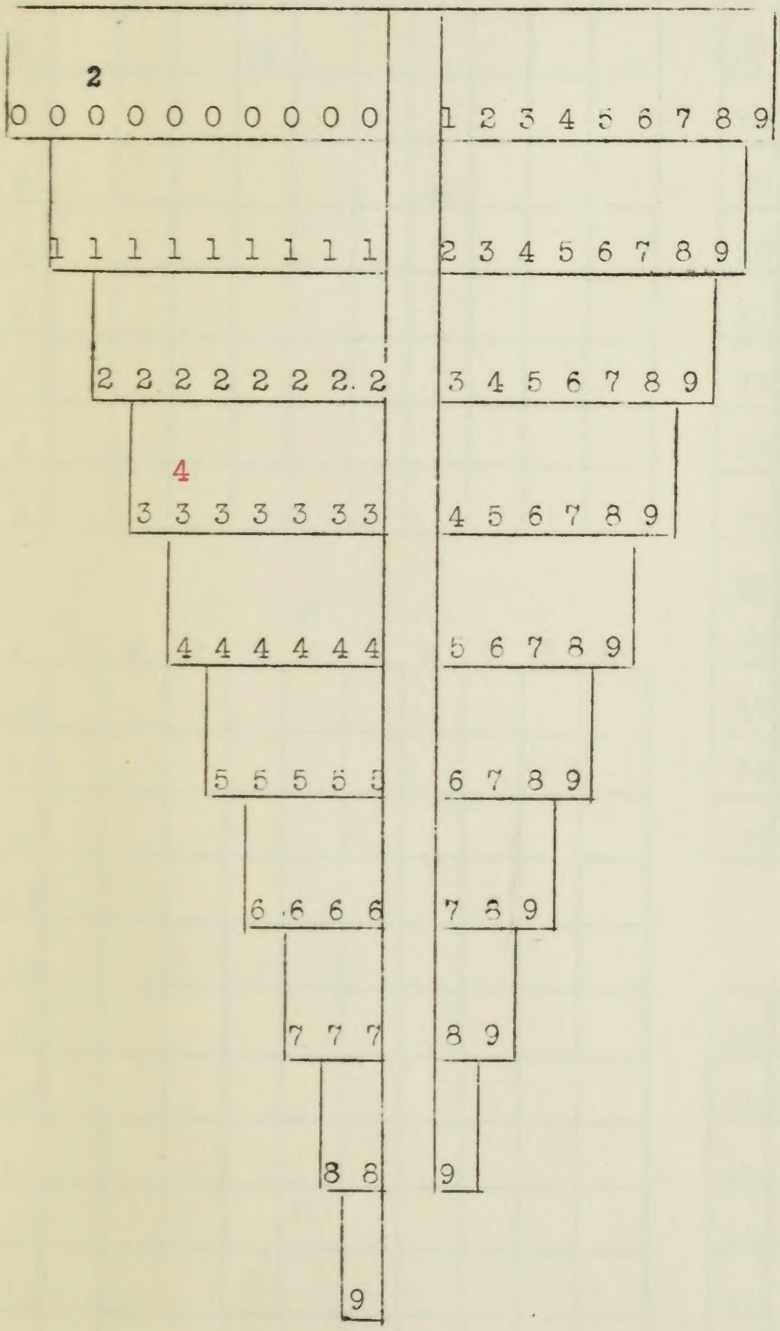
The third table which is numbered III and VI in the respective drill analyses is called the useless table. It contains the combinations that are beyond business and social usage. It is really a part of the second table and is tabulated in the same manner.

TEACHING GROUPS

* Group Sample, Table I, IV

Primary or First Decade Facts

A



B

+	0	1	2	3	4	5	6	7	8	9
10		1								
11										
12						5				
13										
14										
15										
16										
17										
18										
19										
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31										
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33										
34										
35										
36										
37										
38										
39										

C

+	1	2	3	4	5	6	7	8
40								
42								
45								
48								
49								
54								
56								
63								
64								
72								
81								

* New group in red,
Cumulative groups in black.

Group Sample Table II, V.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2				19						
3										
4							30			
5										
6										
7										
8										
9										

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
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22										
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

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45									
48									
49									
54									
56									
63									
64									
72									
81									

The Following Drill Analysis Covers The Addition Drill And The Addition Combinations Used In Multiplication And In Proving Subtraction In The Modern Life Arithmetic Book I

by

J. G. Fowlkes and T. T. Goff

Published By
The Macmillan Company

1928.

Analysis of the Addition
in the Fowlkes & Goff
Modern Life Arithmetic
Book I

Purpose.

This analysis is for the purpose of finding out the following:

1. The teaching groups.
2. The number of combinations taught and their frequency in drill and problems as they appear in:
    a. Addition
    b. Proving Subtraction
    c. Carrying in Multiplication
3. Whether the facts taught precede their occurrence in examples.
4. The process steps taught.
5. Whether the process steps taught precede their occurrence in examples.

In the introduction to the book the authors state that the first two chapters contain a review of what is sometimes taught in the second grade. Since it involves reading and writing numbers up to 1000 and memorizing the 100 primary facts it would be rather a heavy program even for olden times when formal arithmetic in the earlier grades received more emphasis than it does today. Available data well summarized in the Third Yearbook of the Department of Superintendence points to the desirability of deferring the beginning of formal arithmetic until the third grade. Since this book is the first of the series and is designed for Grades III and IV one might reasonably expect to find in it a complete systematic drill service in addition.

Whether it has this or not the tables of this paper will best answer.

Introductory Group

In this book a brief chapter of six pages, devoted to counting, reading and writing of numbers is followed by an introductory page which by means of a rather stilted conversation of two boys with dominoes endeavors to show the need and use of knowing number facts.

The six facts used are recorded on Table V, Section o, page .12.. in the primary group "A" which are read from left to top as: $\begin{array}{ccc}1 & 1 & 2\\ \underline{1} & \underline{2} & 3\end{array}$. Since the work is introductory to the teaching group, Table IV, Section 0 is omitted.

Table V Section 0

Showing Facts Used in the Introductory Group - Fowlkes & Goff, Pages 10-11.

Color for Examples, Black

Group Introductory

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0										
1		1								
2		1								
3			1		1					
4				1						
5										
6		1								
7										
8										
9										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
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30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
13										
14										
15										
16										
17										
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72									
81									

Group I.

On page 10 of the text the authors begin their first teaching group. On pages 10-14 there are twenty problems. On page 14 Fowlkes & Goff Arithmetic are the twenty facts used in these problems, listed with their answers. One might question this procedure particularly when we read, "If you missed any of the problems find the facts for those problems in the following list and study them hard." Myers in the Journal of Educational Research for June 1924, points to the enormous waste which consists largely of leading children to make mistakes, thereby perpetuating them and then desperately trying to correct them.

If the endeavor is being made to keep drill back of meaning should this work not come in the introductory work with the teacher so managing the lesson that the right response is aided?

Again, if they are given as an inventory test, considering the fact that children forget so much during the long vacation should not a review of the facts precede any individual work with problems which might result in wrong responses.

The facts in group are:

$$\begin{array}{ccccc} 1 & 1 & 1 & 1 & 1 \\ \underline{1} & \underline{2} & \underline{3} & \underline{4} & \underline{5} \end{array} \qquad \begin{array}{ccccc} 1 & 1 & 1 & 2 & 2 \\ \underline{6} & \underline{7} & \underline{8} & \underline{2} & \underline{3} \end{array}$$

$$\begin{array}{ccccc} 2 & 2 & 2 & 2 & 3 \\ \underline{4} & \underline{5} & \underline{6} & \underline{7} & \underline{3} \end{array} \qquad \begin{array}{ccccc} 3 & 3 & 3 & 4 & 4 \\ \underline{4} & \underline{5} & \underline{6} & \underline{4} & \underline{5} \end{array}$$

These are written for upward addition in this paper for purposes of comparison with other books analyzed. In the text they are reversed and the author takes for granted the child will add downward for he makes no mention of which way one is to add, yet if facts in examples are to coincide with facts in problems as he intends the addition must be downward.

These facts are shown in red on Table IV-A, Section 1, Page..15.. They are

read from bottom up as 1 + 1, 2 + 1, 3 + 1, etc.

The problems are recorded on Table V-A, Section 1, Page.16. The red triangles placed in the squares indicate the combinations included in this group. That is they are the combinations shown in Table IV-A, Section I, page.15 They are the only combinations which should be used since they are the only ones which have been taught. Black figures indicate combinations used in examples and red figures the combinations used in problems.

Results of Tabulations of Group I

Table V-A, Section I, page 16 shows that:

20 primary facts have been taught
0 primary facts have been used which have not been taught.

Table V-B & C, Section I, page 16 show that:

0 decade facts have been taught
0 decade facts have been used

Table VI, Section I, page 17 shows that:

0 higher decade facts have been taught
0 higher decade facts have been used

Table IV, Section I

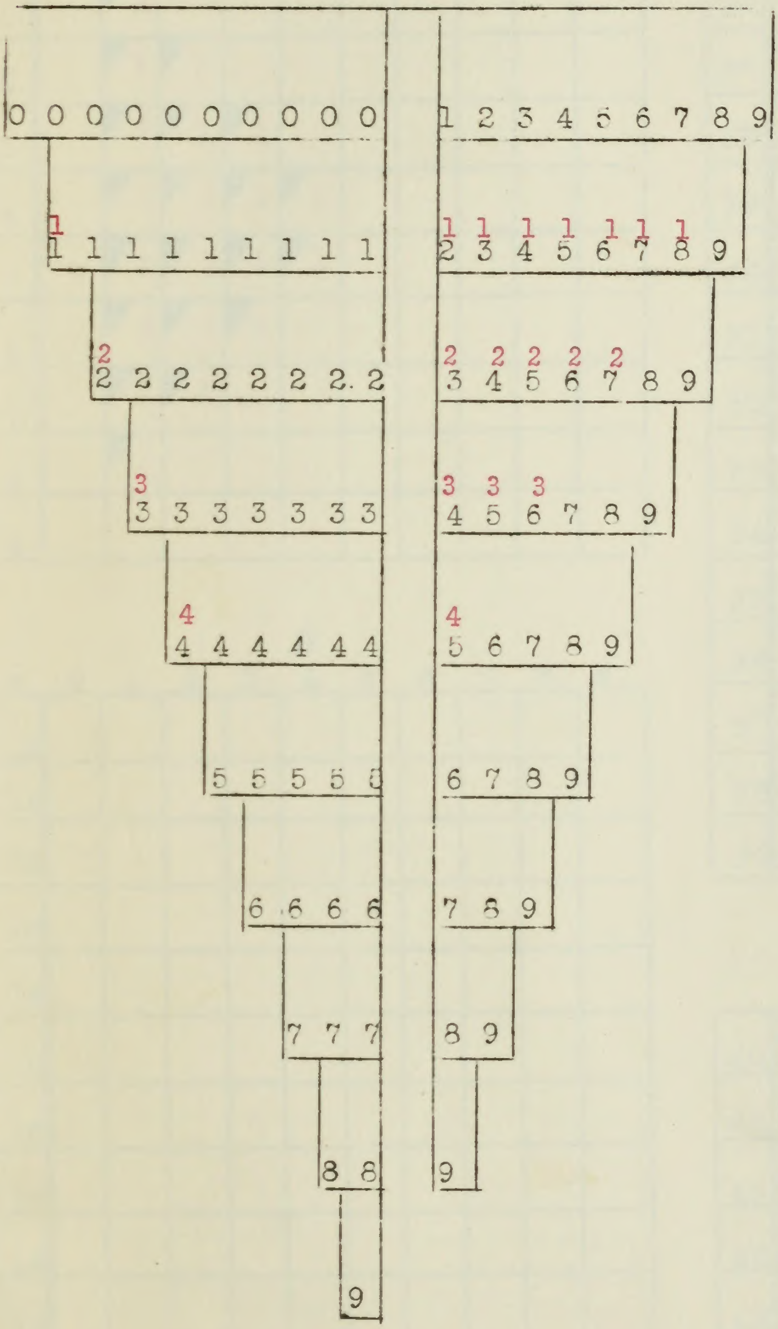
Showing Twenty Facts Taught in Group I.

TEACHING GROUPS

* Group. I, Fowlkes & Goff, Page 14.

Primary or First Decade Facts

A



B

+	0	1	2	3	4	5	6	7	8	9
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11										
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16										
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38										
39										

C

+	1	2	3	4	5	6	7	8
40								
42								
45								
48								
49								
54								
56								
63								
64								
72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section I.

Showing Facts used in Problems for Group I

Group I, Fowlkes & Goff, pages 10 - 14.

Color for Examples, Black

Color for Problems, Red

Table II, Section 1. A

+	0	1	2	3	4	5	6	7	8	9
0										
1		◤1								
2		◤1	◤1							
3		◤1	◤1	◤1						
4		◤1	◤1	◤1	◤1					
5		◤1	◤1	◤1	◤1					
6		◤1	◤1	◤1						
7		◤1	◤1							
8		◤1								
9										

B

+	0	1	2	3	4	5	6	7	8	9
10										
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24										

+	0	1	2	3	4	5	6	7	8	9
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38										
39										
	0	1	2	3	4	5	6	7	8	9

C

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42									
45									
48									
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54									
56									
63									
64									
72									
81									

Facts beyond 39 - 9 Used in Drill
Material for Group I.

Table VI, Section I.

Fowlkes & Goff, Pages 9 - 14.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
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48										
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66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
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99										

Group II and Drill

Group II, Fowlkes & Goff, page 18, includes the reverses of the combinations taught in Group I. Since four of these were doubles this group contains only sixteen combinations:

$$\begin{array}{cccccccccccccccccc} 2 & 3 & 4 & 5 & 6 & 7 & 8 & 3 & \quad & 4 & 5 & 6 & 7 & 4 & 5 & 6 & 5 \\ \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{2} & \quad & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{3} & \underline{3} & \underline{3} & \underline{4} \end{array}$$

These are shown in red, Table IV-A, page.19. The first teaching group is also shown in this table but tabulated in black.

The drill work for this group, Fowlkes & Goff Arithmetic pages 15 - 18 is tabulated in Table V-A, B, C, section II, page.20. The combinations in Table C indicate those needed for carrying in multiplication beyond 39 - 9. The combinations beyond 39 - 9 with the exception of those needed for carrying in multiplication are tabulated in Table VI, page.20. The black triangles in Table V indicate the combinations previously taught.

Results of Tabulations of Group II

Table V-A, section II, page.20.shows that:
36 primary facts have been taught
1 new fact is not used in drill
Only 3 facts taught in Group I were used.

Table V-B & C, section II, page.20.shows that:
0 decade facts have been taught
0 decade facts have been used

Table VI, section II, page.21.shows that:
0 higher decade facts beyond social and business usage have been taught or used.

Table IV, Section II

Showing 16 Facts Taught in Group II

TEACHING GROUPS

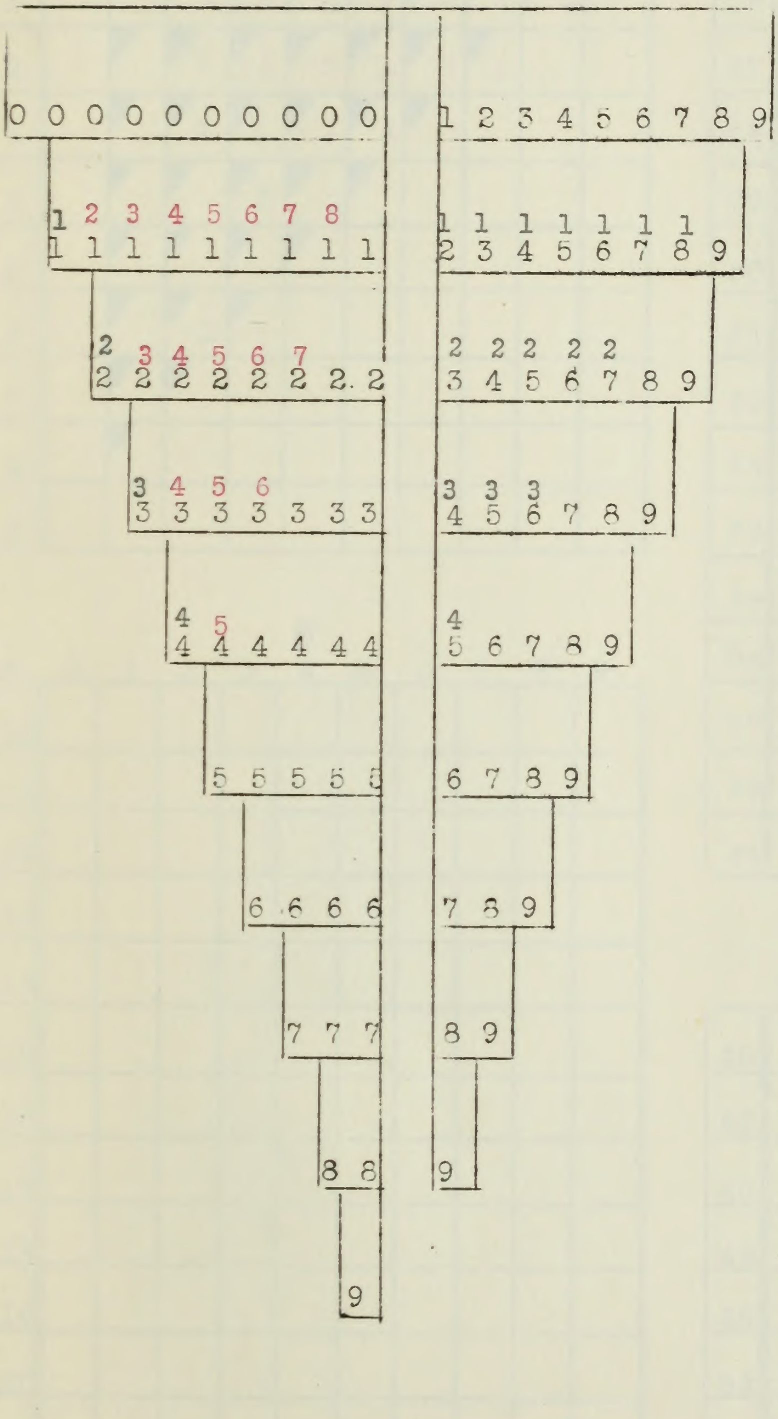
Color for Examples, Black

Color for Problems, Red

* Group II, Fowlkes & Goff, Page 18.

Primary or First Decade Facts

A



B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
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16										
17										
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39										

C

+	1	2	3	4	5	6	7	8
40								
42								
45								
48								
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54								
56								
63								
64								
72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section II.

Showing Facts Used in Drill For Group II

Color for Examples, Black

Color for Problems, Red

Group II, Fowlkes & Goff, Pages 15 - 18.

A

+	0	1	2	3	4	5	6	7	8	9
0										
1		◤	◤ 1	◤ 1	◤ 1	◤ 1	◤ 1	◤ 1	◤ 1	
2		◤	◤	◤ 1	◤ 1	◤ 1	◤ 1	◤ 1		
3		◤	◤ 2	◤	◤ 1	◤ 1	◤ 1			
4		◤	◤	◤ 2	◤	◤				
5		◤	◤	◤	◤					
6		◤	◤ 1	◤						
7		◤	◤							
8		◤								
9										

B

+	0	1	2	3	4	5	6	7	8	9
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C

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64									
72									
81									

owing Facts Beyond 39 - 9 Used in
ill Material. For Group II.

Table VI, Section II

Group II, Fowlkes & Goff
Pages 15 - 18.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
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Group III

Group III Fowlkes & Goff Arithmetic page 19 follows group II immediately without any preliminary problems and includes the following twenty-five facts:

5	4	5	6	3	4	5	6	7	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9
5	6	6	6	7	7	7	7	7	8	8	8	8	8	8	8	9	9	9	9	9	9	9	9	9

As written in this paper they are for upward addition as explained previously. In the book they are reversed and read downward. The Fowlkes & Goff drill seems to be constructed for downward addition as far as one is able to decide. Here for the first time in Group III the authors give the direction "Add downward." Failure to give this direction in the first group makes for confusion as the authors take for granted that certain combinations have been taught when as a matter of fact the reverses may have been studied because upward addition was used.

The facts taught in this group are shown in red on Table IV-A, Section III, page.23. The preceding groups are shown in black.

Table I is cumulative always showing every combination which has been taught.

No drill is provided for this group.

Results of Tabulations of Group III

Table V-A, Section III, page.24..shows that:
61 primary facts have been taught
0 primary facts taught in this group have been used in drill.

Table V-B, Section III, page.24.shows that:
No decade facts have been taught
No decade facts have been used

Table V-C, Section III, page.24..shows that:
No facts needed for carrying in multiplication have been taught.
No such facts have been used.

Table VI, Section III, page.25..shows that
No facts beyond 39 + 9 have been taught or used.

23

Table IV, Section III.

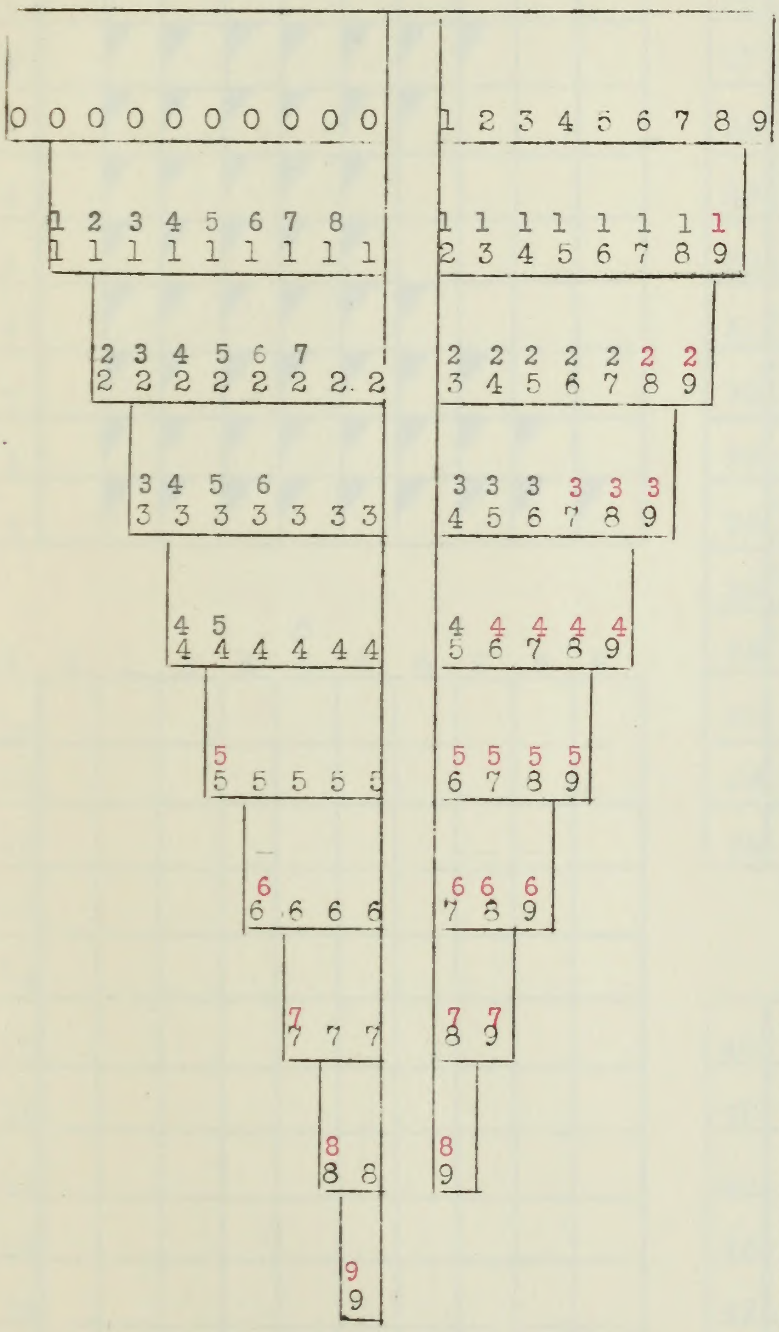
Showing 25 Facts Taught in Group III

TEACHING GROUPS

* Group III, Fowlkes & Goff, Page 19.

Primary or First Decade Facts

A



B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
13										
14										
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16										
17										
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C

+	1	2	3	4	5	6	7	8
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72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section III.

Showing No Drill Material Provided for Group III.

Group III, Fowlkes & Goff, Page 19.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0										
1		◤	◤	◤	◤	◤	◤	◤	◤	
2		◤	◤	◤	◤	◤	◤	◤		
3		◤	◤	◤	◤	◤	◤			
4		◤	◤	◤	◤	◤				
5		◤	◤	◤	◤	◤				
6		◤	◤	◤	◤	◤	◤			
7		◤	◤	◤	◤	◤	◤	◤		
8		◤	◤	◤	◤	◤	◤	◤	◤	
9		◤	◤	◤	◤	◤	◤	◤	◤	◤

B

+	0	1	2	3	4	5	6	7	8	9
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owing Facts Beyond 39 - 9
ed in Drill for Group III.

Table VI, Section III

+	0	1	2	3	4	5	6	7	8	9
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Group IV

Group IV, Fowlkes & Goff Arithmetic page 20 includes the reverses of the combinations in Group III omitting of course the doubles. These twenty facts are as follows:

4	5	7	7	7	7	8	8	8	8	8	8	9	9	9	9	9	9	9	9
6	6	3	4	5	6	2	3	4	5	6	7	1	2	3	4	5	6	7	8

These are shown in red on Table IV-A, page.27

There is no drill work for these facts as is shown in Table V -A, B, C, section IV, page.28.&..29. Table VI, section IV, page.29.

Results of Tabulation of Group IV

Table V-A, Section IV, page.28 shows that:
81 Facts have been taught
0 Facts taught in this group have been used
0 Facts previously taught have been reviewed

Table V-B & C, Section IV, page28..shows that:
0 decade facts have been taught
0 decade facts have been used

Table VI, Section IV, page.29.shows that
0 higher decade facts have been taught or used

One cannot help wondering why the authors have given no drill whatever for Group III & IV. As Meyers says: "Another source of the tragedy of errors is the almost universal tendency to take on new combinations before the old ones have been perfectly mastered."

Table IV, Section IV.
Showing Facts Taught in Group IV

TEACHING GROUPS

* Group IV, Fowlkes & Goff, Page 20.

Primary or First Decade Facts

A

0 0 0 0 0 0 0 0 0 0	1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 2 3 4 5 6 7 8 9
2 3 4 5 6 7 8 9 2 2 2 2 2 2 2. 2	2 2 2 2 2 2 2 3 4 5 6 7 8 9
3 4 5 6 7 8 9 3 3 3 3 3 3 3	3 3 3 3 3 3 4 5 6 7 8 9
4 5 6 7 8 9 4 4 4 4 4 4	4 4 4 4 4 5 6 7 8 9
5 6 7 8 9 5 5 5 5 5	5 5 5 5 6 7 8 9
6 7 8 9 6 6 6 6	6 6 6 7 8 9
7 8 9 7 7 7	7 7 8 9
8 9 8 8	8 9
9 9	

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
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C

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64								
72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section IV.

Showing No Facts Used in Drill Material for Group IV

Group IV, Fowlkes & Goff, Page 20.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0										
1		◤	◤	◤	◤	◤	◤	◤	◤	◤
2		◤	◤	◤	◤	◤	◤	◤	◤	◤
3		◤	◤	◤	◤	◤	◤	◤	◤	◤
4		◤	◤	◤	◤	◤	◤	◤	◤	◤
5		◤	◤	◤	◤	◤	◤	◤	◤	◤
6		◤	◤	◤	◤	◤	◤	◤	◤	◤
7		◤	◤	◤	◤	◤	◤	◤	◤	◤
8		◤	◤	◤	◤	◤	◤	◤	◤	◤
9		◤	◤	◤	◤	◤	◤	◤	◤	◤

B

+	0	1	2	3	4	5	6	7	8	9
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+	0	1	2	3	4	5	6	7	8	9
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39										
	0	1	2	3	4	5	6	7	8	9

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Showing No Facts Beyond 39 - 9
Used in Group IV.

Table VI. Section IV.

+	0	1	2	3	4	5	6	7	8	9
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Group V.

Group V in the text, page 21, follows immediately upon the last group and includes the nineteen zero facts:

$$\begin{array}{cccccccccccccccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{9} & \underline{1} & \underline{2} & \underline{3} & \underline{4} & \underline{5} & \underline{6} & \underline{7} & \underline{8} & \underline{9} \end{array}$$

They are given in mixed order.

The rule is given: "If you add a number to 0, the sum is the same as the number itself. Also, if you add a number to 0, the sum is the same as itself." These illustrations are used:

$$\begin{array}{lll} 3 + 0 = 3 & \qquad & 0 + 3 = 3 \\ 1 + 0 = 1 & & 0 + 2 = 2 \\ 5 + 0 = 5 & & 0 + 6 = 6 \end{array}$$

Then the nineteen facts are listed, the child being asked to supply the answers. I have credited the author with teaching all the facts, using 6 facts, once in the illustrations, and using 7 facts in the problems which accompany this group. If one wishes to credit the authors with teaching and using all the facts it is but necessary to add one black figure to each of the red triangles on the page. Giving the most possible credit to this group it would mean four facts were used three times; five facts, twice; ten facts were used only once.

Thus as the authors claim in the introduction "the zero difficulties have been isolated and grouped" but it must be admitted that very little practice is given them considering the fact that the zero has been recognized as a difficulty.

Results of Tabulations of Group V.

Table V-A, Section V, page.33.shows that:

100 primary facts have been taught

10 of the new facts taught are not used in drill.

0 facts previously taught have been reviewed

Table V-B & C, Section V, page.33.show that:

0 decade facts have been taught

0 decade facts have been used

Table VI, Section V, page.34..shows that no facts beyond social usage have been used.

Table IV, Section V.

19 Zero - Facts Taught in Group V.

TEACHING GROUPS

* Group V, Fowlkes & Goff, Page 21.

B

+	0	1	2	3	4	5	6	7	8	9
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Primary or First Decade Facts

A

0 1 2 3 4 5 6 7 8 9
0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0
1 2 3 4 5 6 7 8 9

1 2 3 4 5 6 7 8 9
1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1
2 3 4 5 6 7 8 9

2 3 4 5 6 7 8 9
2 2 2 2 2 2 2 2

2 2 2 2 2 2 2
3 4 5 6 7 8 9

3 4 5 6 7 8 9
3 3 3 3 3 3 3

3 3 3 3 3 3
4 5 6 7 8 9

4 5 6 7 8 9
4 4 4 4 4 4

4 4 4 4 4
5 6 7 8 9

5 6 7 8 9
5 5 5 5 5

5 5 5 5
6 7 8 9

6 7 8 9
6 6 6 6

6 6 6
7 8 9

7 8 9
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8 9

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C

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72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section V.

Showing Facts Used in Drill Material, Group V.

Color for Examples, Black

Color for Problems, Red

Group V, Fowlkes & Goff, Pages 21 - 23.

A

+	0	1	2	3	4	5	6	7	8	9
0	◤	◤	◤ 11	◤ 1	◤	◤	◤ 11	◤	◤	◤
1	◤ 1	◤	◤	◤	◤	◤	◤	◤	◤	◤
2	◤	◤	◤	◤	◤	◤	◤	◤	◤	◤
3	◤ 11	◤	◤	◤	◤	◤	◤	◤	◤	◤
4	◤ 1	◤	◤	◤	◤	◤	◤	◤	◤	◤
5	◤ 11	◤	◤	◤	◤	◤	◤	◤	◤	◤
6	◤	◤	◤	◤	◤	◤	◤	◤	◤	◤
7	◤ 1	◤	◤	◤	◤	◤	◤	◤	◤	◤
8	◤	◤	◤	◤	◤	◤	◤	◤	◤	◤
9	◤ 1	◤	◤	◤	◤	◤	◤	◤	◤	◤

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Showing Facts Beyond 39 - 9 Used
in Drill Material for Group V.

Table VI, Section V.

Fowlkes & Goff, Group V,
Pages 21 - 23.

+	0	1	2	3	4	5	6	7	8	9
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A Summary of the Drill Material Used So Far In the Work With the 100 Primary Facts.

The 100 primary facts have now been taught. We may pause between groups for a brief summary of what has been provided so far in the way of drill material for these facts.

In five groups of 20, 16, 25, 20 and 19 respectively the 100 facts have been taught.

Results of Tabulation of Drill Material Used So Far.

Table II-A, Partial Summary, page.36.shows that:

Though 100 facts have been taught,
44 facts only have been used in drill.

56 facts have appeared only in the teaching groups.

None of the facts appearing in the first quartile of Clapp's Order of Difficulty have been used in drill.

No fact has been used oftener than three times.

Table II. Partial Summary Table.

Showing Drill Material Used While Getting The 100 Primary Facts.

Color for Examples, Black

Color for Problems, Red

Group Fowlkes & Goff, Pages 10 - 23.

A

+	0	1	2	3	4	5	6	7	8	9
0			1 1	1			1 1			
1	1	1	1	1	1	1	1	1	1	
2		1	1	1	1	1	1	1		
3	1 1	1	2 1	1	1	1	1			
4	1	1	1	2 1	1					
5	1 1	1	1	1	1					
6		1	1	1						
7	1	1	1							
8		1								
9	1									

B

+	0	1	2	3	4	5	6	7	8	9
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Group VI.

On page 25 of the text we find Group VI as I have classified it. The author has not numbered his groups. I have tried to follow his development of the drill as indicated by his titles in black letters, etc. This group is still in Chapter II of Fowlkes & Goff. It is a review group. In the book it is entitled "The 100 Addition Facts. On account of the lack of practice so far one might expect now some drill in examples and problems. Instead the authors give a review of the meaning of such words as addition, equal, plus, sum, etc., and on page 27 is a list of review questions which calls for the knowledge of only 14 of the primary facts.

Most of the practice for this group comes in the next chapter on "Learning to Subtract." In this third chapter on pages 35, 40 and 48, addition practice in the primary facts is given. On page 42 there are addition facts intended to help teach subtraction. Thus we find 1 + 2 =? 7 + 9 = ? In this tabulation all such examples were tabulated 1 + ? = 3 and 6 + ? = 6 were counted as subtraction.

On pages 49 + 52 in the text some addition problems have been included among the subtraction problems. All the addition facts found on pages 23 - 55 are included in this tabulation and the results are shown on Table V, Section VI, page.40.and Table VI, Section VI, page.41.

Since it is a review group each fact is represented on Table V, Section VI by a black triangle with a red hypotenuse.

The 100 facts reviewed are shown on Table IV, Section VI, page.39....

Results of Tabulation of Group VI.

Table V-A, Section VI, page.40..shows that:

100 primary facts have been taught and reviewed.

15 facts reviewed have not been used.

Table V-B & C, Section VI, page.40..show that:

0 decade facts have been taught

0 decade facts have been used

Table VI, Section VI....page.41..shows that:

0 higher decade facts beyond social usage have been taught.

0 higher decade facts beyond social usage have been used.

Table IV, Section VI.
Showing Facts Taught in Review Group VI.

TEACHING GROUPS

* Group VI, Fowlkes & Goff, page 25.

Primary or First Decade Facts

A

0 1 2 3 4 5 6 7 8 9
0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0
1 2 3 4 5 6 7 8 9

1 2 3 4 5 6 7 8 9
1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1
2 3 4 5 6 7 8 9

2 3 4 5 6 7 8 9
2 2 2 2 2 2 2 2

2 2 2 2 2 2 2
3 4 5 6 7 8 9

3 4 5 6 7 8 9
3 3 3 3 3 3 3

3 3 3 3 3 3
4 5 6 7 8 9

4 5 6 7 8 9
4 4 4 4 4 4

4 4 4 4 4
5 6 7 8 9

5 6 7 8 9
5 5 5 5 5

5 5 5 5
6 7 8 9

6 7 8 9
6 6 6 6

6 6 6
7 8 9

7 8 9
7 7 7

7 7
8 9

8 9
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9
9

B

+	0	1	2	3	4	5	6	7	8	9
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* New group in red,
Cumulative groups in black.

Table V, Section VI.

Showing Facts Used in Drill Material for Review Group VI.

Fowlkes & Goff,
Group VI, Pages 22 - 55.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	3	1		1			1	1	1	1
1	1	1	3	3	1	1	1 1	1	3	1
2	1	1		1	1	1	2 1	2	2	2
3	1	1	2	2	2	4	1		1	2
4	4	1	1	1 1		2	1		2	2
5	1	1	3	1	2 1				3	1
6		1	3	2		1	1	2 1	1	
7	2	1	2		1	1 1	2	2	2	2
8	3	1		1			2	2	1	1
9	1	1	1	1	1	1	2	2 1	2	1

+	0	1	2	3	4	5	6	7	8	9
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	0	1	2	3	4	5	6	7	8	9

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Showing Facts Taught Beyond 39 - 9
used in Group VI.

Group VI, Fowlkes & Goff,
Pages 23 - 55.

Table VI, Section VI.

+	0	1	2	3	4	5	6	7	8	9
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Group VII.

With this group the authors begin to consider the process steps which up to this group have been neglected.

Adding by columns is the title of Fowlkes & Goff's fourth chapter. Here adding by short columns is illustrated by two examples each consisting of a single column of three addends.

Immediately the children are directed to prove examples, by adding upward whenever requested.

Counting in the proving, fifty-two two-column examples are given. The sum in each column is less than 10. No decade work is involved. The zero is not recognized as a difficulty. It does not appear in either illustrative example but it does occur in eight of the practice examples.

Adding by longer columns is taken up, but as the sum is still less than 10 there is no other difficulty involved than that incurred by having a few more unseen addends. Ten such columns are given, - single columns of four or five addends.

Two figure addition is next considered, pages 64 - 66 in the text. Here the zero is used in each illustrative example.

One illustrative example with a gap is given. One problem using this knowledge is given. Eighteen two figure examples not involving gaps appear next. Returning to gaps only 6 examples featuring gaps are then listed.

No decade work is involved. All columns sum up to less than 10.

United States money is taken up in connection with playing store.

In this group ten decade facts are taught on pages 60 - 61 of the text. They are rather sketchily taught. The authors probably have in mind such decade facts as involve no bridging. They call it "Adding By Endings." The only real conclusion reached and stated in black type enclosed in a rectangle is -

"If you add 3 to a number ending in 4, the sum always ends in 7." One wonders just why this one fact receives such stress and just how it would help one to add 16 + 3 for instance.

But, ten decade facts with their answers are included and I am crediting the authors with teaching them.

They are as follows:

$$\begin{array}{rrrr} 3 & 3 & 3 & 3 \\ \underline{14} & \underline{24} & \underline{34} & \underline{44} \end{array}$$

$$\begin{array}{rrrrrr} 5 & 5 & 5 & 6 & 6 & 6 \\ \underline{14} & \underline{24} & \underline{34} & \underline{12} & \underline{22} & \underline{32} \end{array}$$

One of these $\begin{array}{c} 3 \\ \underline{44} \end{array}$ is beyond social usage. Therefore it does not appear on Table IV, Section VII, page..45. It is shown on Table VI, Section VII, page..47.

The drill for these decade facts is found on pages 60 - 62, Fowlkes & Goff.

The drill for the entire group is on pages 55 - 86, in the text. Most of it, however, is on pages 55 - 76. From pages 79 - 86 the authors are teaching subtraction. Therefore only 11 primary facts in addition are found on those pages.

Beginning with this group another tabulation is necessary showing the combinations used in proving subtraction pages 81 - 86 in the text. These facts are shown on Table VII, Section VII, page..48.

In this analysis every subtraction example from page 81, Fowlkes & Goff, to the end of the book was proved and the results tabulated as on that page the authors state:

"You should prove every example in subtraction that you work."

Results of the Tabulations of Group VII.

Table V Page 46

Table V-A, Section VII, shows that:

None of the facts included in Clapp's first quartile in the order of difficulty are used in this drill with the exception of 9 - 9.

Table V-B, Section VII, page. 46. shows that:

9 decade facts below 39 + 9 have been taught
12 decade facts below 39 + 9. have been used which have not been taught.
3 decade facts taught have not been used.

Table V-C, Section VII, page. 46. shows that:

0 decade facts needed for carrying in multiplication have been taught.
0 decade facts needed for carrying in multiplication have been used.

Table VI, Section VII, page. 47. shows that:

1 higher decade fact beyond social and business usage has been taught.
6 higher decade facts beyond social and business usage have been used.

Table VII, Section VII, page. 48. shows that:

54 facts have been used in proving subtraction.

The more difficult facts are not included in this drill.

Table IV, Section VII.
Showing Facts Taught in Group VII

TEACHING GROUPS

* Group VII, Fowlkes & Goff, Pages 60 - 61.

Primary or First Decade Facts
A

0 0 0 0 0 0 0 0 0 0	1 2 3 4 5 6 7 8 9
1 1 1 1 1 1 1 1 1	2 3 4 5 6 7 8 9
2 2 2 2 2 2 2 2	3 4 5 6 7 8 9
3 3 3 3 3 3 3	4 5 6 7 8 9
4 4 4 4 4 4	5 6 7 8 9
5 5 5 5 5	6 7 8 9
6 6 6 6	7 8 9
7 7 7	8 9
8 8	9
9	

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12							6			
13										
14				3		5				
15										
16										
17										
18										
19										
20										
21										
22							6			
23										
24				3		5				
25										
26										
27										
28										
29										
30										
31										
32							6			
33										
34				3		5				
35										
36										
37										
38										
39										

C

+	1	2	3	4	5	6	7	8
40								
42								
45								
48								
49								
54								
56								
63								
64								
72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section VII.

Showing Facts Used in Drill Material for Group VII.

Group VII, Fowlkes & Goff, Pages 56 - 86.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	3 2	2 3	5 1	2 1	2 1	3 1	1	2	4	2
1	4	11 6	7 4	3	5 2	2	1	4 1	2 3	
2	7 1	13 1	9 4	10	9 3	4 2	4	4		
3	6	9 1	10 2	6 1	15 4	4 2	6 1			
4	4	13 2	16 3	13 5	8	2 2				
5	5 1	10 1	8 2	11 4	3 1		2			
6	3	10	12 1	12 2						
7	12 1	8	14 3	1						
8	9	11 1								
9	9 1									1

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12							◤			
13										
14	1	1	1	◤ 2	1	◤ 2				
15										
16										
17										
18										
19										
20										
21										
22										
23										
24	1	1	1	◤ 2	1	◤ 2				

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32							◤			
33										
34	1	1	1	◤ 1	1	◤ 2				
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Facts Beyond 39 - 9
Taught & Used in Group VII.

Table VI, Section VII.

Fowlkes & Goff,
Pages 56 - 86.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44	1	1	1	2	1	1				
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
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88										
89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										

Table VII, Section VII

Facts used in proving subtraction.

Color for Examples, Black

Group VII, Fowlkes & Goff, Pages 81 - 86.

Color for Problems, Red.

A

+	0	1	2	3	4	5	6	7	8	9
0	3	2 2	1	3 1	3	2 3	1	2	2	2
1	2 2	1 3	1 2	2 1	1 2	3	2	1	2	
2	1	3 2	3 3	2 1	2	4 1	2 3	2 1		
3	3 1	2	1 1	1	3 2	2	2 2			
4	3	1	3 1	1	2	1 2				
5	1 2	2	3	3 2	3					
6	3	2	2 2	2						
7	1	5	1 1							
8		1								
9	1									

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Group VIII

In this group carrying in addition is taught as well as certain decade facts. In the illustrative examples the sums of the left hand columns are less than 10, but in the drill one problem on page 92 and one example on page 93 have the sums of the left hand columns 10 and 11 respectively.

After three and one-half pages involving bridging the following decade facts are taught:

$$\begin{array}{rrrr}
5 & 5 & 5 & 5 \\
\underline{19} & \underline{29} & \underline{39} & \underline{49} \\
 & & & \\
7 & 7 & 7 & 7 \\
\underline{19} & \underline{29} & \underline{39} & \underline{49} \\
 & & & \\
5 & 5 & 5 & 5 \\
\underline{18} & \underline{28} & \underline{38} & \underline{48}
\end{array}$$

As in the last group these facts are taught in a rather unusual way. In black type the author has but one rule.

"If 5 is added to a number ending in 9 the number of tens in the sum is 1 more than the number of tens in the number and the sum always ends in 4.

Of the facts that I am crediting the authors with teaching, two of them (48 + 5 and 49 + 5) are higher decade facts needed for carrying in multiplication. One fact, 49 + 7, must be classified among those beyond social and business usage. The other decade facts are tabulated on Table IV-B, Section VIII, page.51.

The drill work for this group, Fowlkes & Goff Arithmetic covers many pages. It is therefore necessary to divide the work into seven parts.

Table IV will be omitted from now on as the authors have finished their teaching groups. The following tabulation shows the record of all combinations used on pages 88 - 104 inclusive in the text book.

Group VIII

Table V Page 52.

Part I.

Table V-A, Section VIII, Part I, shows that:

Very little drill was given to such facts as 0 + 9, 0 + 7, o + 6, 0 + 4.
2 facts received no drill in this group.

Table V-B, Section VIII, Part I, shows that:

18 decade facts up to 39 + 9 have been taught
80 decade facts have been used which have not been taught
4 decade facts taught in this group have not been used in drill.

Table V-C, Section VIII, Part I, shows that:

2 facts needed for carrying in multiplication have been taught
8 facts needed for carrying in multiplication have been used in addition.

Table VI Page 53

Table VI, Section VIII, Part I:

2 useless facts have been taught.
2 useless facts have been used in drill.

Table VII, Section VIII, Part I, page...54...shows that:

81 primary facts have been used in proving subtraction.

Table IV, Section VIII
Showing Facts Taught on Pages 94 & 95 Fowlkes & Goff
TEACHING GROUPS

* Group VIII, Part I, Fowlkes & Goff.

Primary or First Decade Facts

A

0 1 2 3 4 5 6 7 8 9	0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0	1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9	1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1	2 3 4 5 6 7 8 9
2 3 4 5 6 7 8 9	2 2 2 2 2 2 2
2 2 2 2 2 2 2 2	3 4 5 6 7 8 9
3 4 5 6 7 8 9	3 3 3 3 3 3
3 3 3 3 3 3 3	4 5 6 7 8 9
4 5 6 7 8 9	4 4 4 4 4
4 4 4 4 4 4	5 6 7 8 9
5 6 7 8 9	5 5 5 5
5 5 5 5 5	6 7 8 9
6 7 8 9	6 6 6
6 6 6 6	7 8 9
7 8 9	7 7
7 7 7	8 9
8 9	8
8 8	9
9	
9	

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12							6			
13										
14				3		5				
15										
16										
17										
18						5				
19						5		7		
20										
21										
22							6			
23										
24				3		5				
25										
26										
27										
28						5				
29						5		7		
30										
31										
32							6			
33										
34				3		5				
35										
36										
37										
38						5				
39						5		7		

C

+	1	2	3	4	5	6	7	8
40								
42								
45								
48					x			
49					x			
54								
56								
63								
64								
72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section VIII, Part I.

Showing Facts Used in Addition

Group VIII, Part I. Fowlkes & Goff, Pages 88 - 104.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	1	1	1	1	1	1	2	1	1	1
1		22 5	25 1	26 2	24 3	9	3 3	6	8 1	11
2	2	10 3	7 2	9 3	6	4	4	3	1	3
3	4	17 3	12 4	3	5	7	3	3	4	1
4	3	20 3	16 1	7 2	9	7	2	1 1	3	3
5	5 2	21 3	15 1	10 1	8	4 1	2	4	3 1	5
6	4 1	13	17 1	5 1	3 1	5	3	3	5	3
7	1 1	3 1	10 1	3	2	6 3	5	6	2 1	5
8	2 1	3 1		7	4 1	5 4	3	5 2	2 2	8 1
9	4 1	3	3 1	4	1	4 1	8 1	8	8 2	7

B

+	0	1	2	3	4	5	6	7	8	9
10		1	1		1	1	2	2	2	1
11				1	1		1			1 2
12			1				◤		1	2 1
13								1		3
14		1		◤		◤ 1		2	2	4
15						1	3	1	1	3 2
16					1		1		2	3 1
17				1		1	2	2 1	3	5 1
18				1		◤ 1			2	3
19		1				◤ 1		◤		1
20										
21										2
22							◤			3
23									2	3
24				◤		◤			1 2	1 1

+	0	1	2	3	4	5	6	7	8	9
25						1			2	3
26						1			1	3
27						1		1		4
28					1	◤ 1		1		
29		1	1		1	◤		◤	1	
30										
31										2
32							◤			2 1
33										2
34				◤		◤	1			
35										2
36										2
37						1		1	1	1
38			1		1	◤		1		
39		1	1	2	1	◤ 1	1	◤ 1		
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48		1		1	x		1		
49	1	1	1	1	x	1			
54									
56									
63									
64									
72									
81									

Group VIII, Part I, Fowlkes & Goff
Pages 90 - 101.

Table VI, Section VIII, Part I.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
46										
47						1			1	
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
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90										
91										
92										
93										
94										
95										
96										
97										
98										
99										

Table VII, Section VIII, Part I.

Facts used in proving subtraction pages 93 & 97 & Problems page 101.

Color for Examples, Black

Color for Problems, Red

Group VIII, Part I.

A

+	0	1	2	3	4	5	6	7	8	9
0	1			1	1	1	1	1	1	1
1	1	1	1			1		1	1	
2	1		1	1				1	1	1
3	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	11	1		1	1
5	1	1	1	1	1	1	1	1		1
6	1	1	1	1	1	1	1		1	
7	1		1	1	1	1	1	1	1	1
8		1	1	1		1		1	1	1
9		1	1		1	1	1	1	1	1

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

C

40										
42										
45										
48										
49										
54										
56										
63										
64										
72										
81										

Group VIII and Drill

Part II.

Fowlkes & Goff Arithmetic, pages 105 - 180.

The chapter headings as the authors have them are:

Borrowing in Subtraction

Learning to Multiply

Beginning with this Part a new table, Table VIII, is inserted when necessary to show the addition facts used in multiplication.

Table V-A, Section VIII, Part II, page.56.shows that:

No drill was given to 10 difficult facts.

Table V-C, Section VIII, Part II, page.56.shows that:

Only 21 decade facts were used in drill.

Table VI, Section VIII, Part II, page.57.shows that:

No facts beyond social usage have been used.

Table VII-A, Section VIII, Part II, page.58.shows that:

All but 8 facts were used in proving subtraction.

Table V, Section VIII, Part II.

Showing Facts Used in Addition, Pages 105 - 180.

Color for Examples, Black

Color for Problems, Red

Group VIII, Fowlkes & Goff, Pages 105-180.

A

+	0	1	2	3	4	5	6	7	8	9
0	1 1	1 1	1	1	1 1	1 1	1	1 1		1
1	16 2	36 1	9 2		1	1	1 1			1
2	58	1		1	2	2			1 1	1
3	9	2	4 1	1	2	2			1	1
4		2	2	1 1	1	1	1	2	1	1 1
5	1 1	3 1	2	2 2	2	1 1	1	2	1	1
6	1	2	2	2 1	2 1	1	1	2 1	1	1
7	1	3 1	2	1 2	1	1 2	1	1	2	1 1
8	1 1	2	1	2	2	1 1	1	1 1	1	1
9	2	1	1 2	2 1	1	1 1	2	2 1	1	2

B

+	0	1	2	3	4	5	6	7	8	9
10		2	1							
11		1						1	1	
12		1					1		1	1
13			1					1		
14										
15							1			
16	1		1				1			
17										
18									1	1
19										
20										
21										
22										1
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										1
27										
28										
29										
30										
31										
32										
33										
34										1
35										1
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Showing Facts Beyond Social Usage
Used in Drill, Pages 105 - 180.

Table VI, Section VIII, Part II.

Fowlkes & Goff,
Group VIII, Part II.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
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93										
94										
95										
96										
97										
98										
99										

Table VII, Section VIII, Part II.

Showing Facts Used in Proving Subtraction, Pages 105 - 180.

Group VIII, Part II. Fowlkes & Goff Pages 105 - 180.

Color for Examples, Black

Color for Problems, Red.

A

+	0	1	2	3	4	5	6	7	8	9
0	1	3	2	3	3	1	3			2
1	13 3	12 9	18 3	18	12	5 1	6 1	6 5	7 2	14 1
2	1 1	2 5	3	1 1	3 1	4 3	3	2	1	1
3	3	3 3	1 1	3	3	3 1	3	1	2 1	2
4	3	4	2 1	3	4	4	2	2	1	3
5	2 1	1	5 1	5 1	6	5	2	1	4	1
6		2 1	3 2	3 1	2 1	3 2		1	3	2
7	2	3	5 1		2	4	3 1	1	3 2	1
8	3 1	1 2	6 2	4 2	4 2	1	2 3	2	1	2
9	1	2	1 1	1 3	1				2	3 1

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Table VIII, Section VIII, Part II

Facts Used in Teaching Multiplication and Proving Multiplication.

Color for Examples, Black

Color for Problems, Red

Group VIII, Part II Fowlkes & Goff
Pages 124, 145, 165, 167, 195

A

+	0	1	2	3	4	5	6	7	8	9
0	35									
1	2	44			1	2	1		1	
2		34	29		1			1	1	
3		20		29						
4		14	13		22					
5		13			2	10				
6		11	3	16	1	2				
7		6					1	2		
8		1			8				2	
9				1	1			1	1	1

B

+	0	1	2	3	4	5	6	7	8	9
10					1	8			1	
11						1				
12				1	6		1			
13										
14					1			2		
15						6				
16					5	1		1	1	
17								1		
18					1		1			
19										
20					4	5				
21						1				
22										
23										
24					3		1		1	

+	0	1	2	3	4	5	6	7	8	9
25						4				
26										
27										
28					2				1	
29										
30						3	1			
31										
32					1				1	
33										
34										
35						2				
36							1			
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

	0	1	2	3	4	5	6	7	8
40						1			1
42							1		
45									
48							1		1
49									
54									
56									
63									
64									
72									
81									

Group VIII, Part III.

Fowlkes & Goff, pages 181 - 236.

In this group carrying in multiplication is taken up. On pages 184 - 185 twenty illustrative examples are given, showing the children how to carry 2, 3, 4, 5, etc., but the necessary addition facts have not been previously taught. It is taken for granted the children will know these facts. On pages 182, 185, 219, 223, 225 and 226, practice is given as follows:

The numbers from 1 to 9 are listed in irregular order and the children are asked to multiply: By 8 and add 1, 2, 3, 4, 5, etc.

By 6 and add 1, 2, 3, 4, 5, etc.

Beginning with this group a new Table, Table VIII, will be included when necessary to show the facts used in multiplication.

In Table V, Section VIII, Part III, Page.61..

A shows that:
8 primary facts have been given no drill, yet some of these are known to be difficult combinations, as 4 + 8   8 + 5   6 + 6   6 + 4

B shows that:
53 decade facts that were not taught were used

C shows that:
0 decade facts for carrying in multiplication have been used in addition.

Table VI, Section VIII, Part III, Page.62.shows:
No higher decade facts beyond social usage have been used

In Table VII, Section VIII, Part III, Page.63.shows:
A shows that 55 primary facts were used in proving subtraction

In Table VIII, Section VIII, Part III, Page.64..

A shows that:
42 primary facts have been used in multiplication work

B shows that:
18 decade facts have been taught
84 decade facts have been used

C shows that:
2 higher decade facts needed for carrying in multiplication have been taught.
78 facts needed for carrying in multiplication have been used
2 facts have not been taught or used

Table V Section VIII Part III

Showing Fact Used in Addition on these pages.

Color for Examples, Black

Group Fowlkes & Goff- Group VIII Part III

Pages 181-236

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	1 2	2				3 1	2 1	1	1	1
1	4 2	15 2	13	7 1	4 2	4	2 1	1 1	4 2	1 2
2	3	3 1	5	1	2 2	1 1	1	1	1 1	2
3	1 1	4	3 2	3	1	1	2 1	1	2	
4	2	2 1	3 1	4	3	2	2 1	1		2
5	2 2	2	1 2	2	1	1 1	3	7 1	1 1	1
6	2	2 1	1	2 1		3		1	3	2 1
7	1	3	1	1	4	1	2	1	1 1	2
8	1	2	1	3			1	2	1	1
9	1	1 1	1	1	1 1	1 2	4	1	1	1

B

+	0	1	2	3	4	5	6	7	8	9
10	1 1		1	1		2 2		1		1
11	1	4	1		1	2	1	1		
12		1		2	1 1	1	1	1	1	
13	1	1	1 1		1	1	1 1	1		
14	1				1		1			1
15	1	3	2	2 1		1		1		1
16	1		1	1		1			1	1
17	1	1	1			1	1			1
18										
19										
20										
21						1				
22										
23										
24						1		1		

+	0	1	2	3	4	5	6	7	8	9
25									1	
26										
27										
28										
29										
30										
31										
32										
33										1
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Showing Facts Beyond 39 - 9 Used in pages 181 - 236.

Table VI, Section VIII, Part III.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
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86										
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89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										

Table VII, Section VIII, Part III.

Facts Used in Proving Subtraction pages 181 - 236

Group Fowlkes & Goff, Group VIII, Part III
Pages 181 - 236

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	5	1	1	1		3				
1	2 1	2 1	1	2 1	1 3	4 1	2 1	1 1	3	4 1
2	1	2	1	1		1				
3	1	1			1	1			1	
4		1 1	1 1	1		2			1	1
5	1 3	3	1 2	1		1				
6	2		2 2		1		1		1	1
7	1	4		1	1	2				
8	1	5	1	1		1				
9		3	1	1						

B

+	0	1	2	3	4	5	6	7	8	9
10	2									
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Table VIII Section VIII Part III

Addition facts used in carrying in multiplication, pages 181 - 236.

Group Fowlkes & Goff, Group VIII, Part III.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0		14	10	13	7	5	2	2	1	
1										
2		2 5								
3		2 2	2							
4		5 7		2						
5		2	1	1	3					
6		8 5	6 1	3	1	2				
7		3	2	2		1	1			
8		2 12	2	2	1	1	1	1		
9		1 6	2	2	1	2	1	1	2	

B

+	0	1	2	3	4	5	6	7	8	9
10		4 1	1 2		1					
11										
12		12 4	3		5 1	1	2			
13										
14		8 1		2		1	1			
15		1 3	3		2					
16		11 2	2	2 1	2 1	1	1	1		
17										
18		9 2	5	4	3	4	2	1	2	
19										
20		1	2	1 1	1					
21		2	1	2			1			
22										
23										
24		11	3 1	2	4	3				

+	0	1	2	3	4	5	6	7	8	9
25		2	1 1	1	3	1	1	1		
26										
27		3	1	2	1	2	1	1	2	
28		4 1	5 1		1					
29										
30		1	4	2	4	2 1				
31										
32		4		1	3	1	2	1		
33										
34										
35			2	1	4		1			
36		4	3	3	3	4	2	2	2	
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

	0	1	2	3	4	5	6	7	8	9
40		4	2	1	2	1	1	1		
42		3	4	3	5	5	2			
45		5	1	1	2	4	1	1	2	
48		3	2	4	5	x 5	1	1		
49			2		2	x 2	1			
54		3	2	2	5	3	1	1	2	
56		1	3	1	2	4	2	1		
63		3	2	3	3m	3	1	1	1	
64		2	1	1	1	1	1	1		
72		3	2	2	3	2	2	4	2	
81		2	2	2	2	2	2	1	2	

Group VIII, Part IV.

Two chapters are included here. The second chapter, pages 251 - 276, in the text, gives some attention to adding dollars and cents. Larger numbers are used in subtraction. The facts used in proving all subtraction examples for this group appear on Table VII, Section VIII, Part IV, page..68

In the first chapter the authors are testing addition, subtraction, multiplication, and division. Adding dollars and cents appears in only one problem in this testing chapter. Gaps, zeros and carrying are included to some extent. The 100 primary facts are tested. As may be seen from the tables following, the decade work is weak.

These chapters begin the work which the authors claim is usually offered in Grade IV.

In Table V, Section VIII, Part IV, Page.66.

A shows:
The drill on the primary facts is fairly evenly distributed.

B shows:
Not one of the decade facts between 28 + 1 and 39 + 9 has been used.
125 decade facts only have been used.

C shows:
None of the facts needed for carrying in multiplication have been used.

Table VI, Section VIII, Part IV, page.67.shows that:

No higher decade facts beyond 39 + 9 have been used.

Table VII, Section VIII, Part IV, page.68.shows that:

100 primary facts have been used in proving subtraction
6 decade facts have been used in proving subtraction

In Table V, Section VIII, Part IV, page.69.
A shows the 13 primary facts used in carrying in multiplication

B shows the 15 decade facts used in carrying in multiplication

C shows the 7 higher decade facts needed for carrying in multiplication

Table V, Section VIII, Part Iv.

Showing Facts Used in Addition, pages 237 - 276.

Group Fowlkes & Goff, Group VIII, Part Iv.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	6	4	4 2	3	5	4 2	5	1	2	3
1	6 1	11 2	16 1	8	9	9	7	13 1	9	9
2	3	9 3	7	6	6	5	5	6	2	3 1
3	3	4 2	6 1	5	7	5	4	5	2	5
4	3	5	7	5	5	5	3	5	4	5
5	5 2	5	7	6	5	3 4	5	6	4 1	7
6	4	6	6	5	3	4	4	4	4	5
7	3	5	7	5	6	6	4	4	4	3
8	3	6	5	4	4	6 1	6	6 1	2	3
9	2	3	3	4	4	5	5	4	3	3

B

+	0	1	2	3	4	5	6	7	8	9
10	1	2	1	2 1	1	2	1	2	1	1
11	1	1	1	1	1	2	1 1	1	2	1
12	1	1	1	1	1	1	1 1	1	1	2
13	1	1	1	2	1 1	1 1	1	1	1	1
14	1	1	1	3	1		2	1	1	1
15	2	1	1	1	1	4	1	1	1	1
16	1	1	1	2	1	2	2	1	1	1
17	1	1	1	1 1	2	1	1	2	1 1	1
18	1	1	1 1	1	1	1	1	1	2	
19	1	1	2	1	1	1	1			
20	1	1	1	1	1	1 1	1 1			
21	1	1	1	1	1	1				
22	1	1	1	1	1					1
23	1	1	1	1						
24	1	1	1							

+	0	1	2	3	4	5	6	7	8	9
25				1						
26										1
27					1					
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Showing Facts Beyond 39 - 9 Used
on Pages 236 - 276.

Table VI, Section VIII, Part IV.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
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56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
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96										
97										
98										
99										

Table VII Section VIII Part IV

Showing Facts Used in Proving Substraction.

Group Fowlkes & Goff- Group VIII-Part IV
Pages 237-276

Color for Examples, Black
Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	2	1	1	1	1	2	1	2	2	1
1	12	14	21	15	19	10	12	9	11	1 20
2	1	3	2	3	4	2	2 1	1	8	3
3	2	2	3	3	2	1	2	7	2	2
4	1	3	3 1	3	4	2	6	4	1	3
5	2 2	2 1	2	3 1	2	12 1	3	3	3	2
6	1	2	2	5	6	1	2	3	2	1
7	1	2 1	5	7	2	3	4	3	2	3
8	1	2 1	4	3	4	4	2	2	2	3
9	2	6	3	4	2 1	4	1	3	1	2

B

+	0	1	2	3	4	5	6	7	8	9
10	5			1		1 1	2		1	2
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Table VIII, Section VIII, Part IV.

Addition Facts Used in Carrying in Multiplication, pages 237 - 276.

Group Fowlkes & Goff, Group VIII, Part Iv.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0			1							
1										
2		1								
3		1	1							
4		1 2		1						
5										
6		1 3	1	1	1					
7										
8		3	1							
9			1							

B

+	0	1	2	3	4	5	6	7	8	9
10		2	1							
11										
12			2							
13										
14		2	1	1						
15			1							
16		1								
17										
18										
19										
20										
21										
22										
23										
24		1			1			1		

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28						1				
29										
30					1					
31										
32			1							
33										
34										
35					1					
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40										
42				1						
45										
48		1								
49				1						
54										
56										
63										
64										
72					2					
81			1		1		1			

Group VIII and Drill

Part V

Fowlkes & Goff Arithmetic, pages 276 - 296.

This is a miscellaneous group which makes its greatest contribution in facts used in multiplication. Finding the cost of grocery orders, studying a bill, and adding four place figures of two addends are touched upon.

Table V-A, Section VIII, Part V, page.71.shows that:
55 primary facts have been used in addition

Table V-B, Section VIII, Part V, page.71.shows that:
13 decade facts only were used.

Table V-C, Section VIII, Part V, page.71.shows that:
0 higher decade facts needed for carrying in multiplication have been used.

Table VI, Section VIII, Part V, page.72.shows that:
No facts beyond social usage have been used.

Table VII, Section VIII, Part V, page.73.shows that:
37 primary facts have been used in proving subtraction
1 decade fact has been used in proving subtraction

Table VIII-A, Section VIII, Part V, page.74.shows that:
13 of the more difficult primary facts receive no drill.

Table VIII-B, Section VIII, Part V, page.74.shows that:
46 decade facts only are used.

Table VIII-C, Section VIII, Part V, page.74.shows that:
25 higher decade facts needed for carrying in multiplication have been used in carrying in multiplication.

Table V, Section VIII, Part V.

Showing Facts Used in Addition.

Group Fowlkes & Goff, Group VIII, Part V.
Pages 276 - 296.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	1 1		1			2				
1	1	1 1	2 1	2 2	1	3		2	1 2	1 1
2		1	1 2	1	1	1				
3		2	1			1 1	1		1	1
4		1	1 3	1	1 1					
5				1	1	2	1	1	1	1
6	2	2	12	1	12		1			
7		1	1	1 1	1					
8		12	1	1		1		1		1
9	1		1		1		1	1		

B

+	0	1	2	3	4	5	6	7	8	9
10					1	1			1	
11										
12					1					
13								1		
14					1					
15				1						
16										
17			1							
18							1			
19										
20			1							
21										
22										
23					1					
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29						1				
30										
31										
32										
33										
34				1						
35										
36										
37										
38										
39										

0 1 2 3 4 5 6 7 8 9

C

40	
42	
45	
48	
49	
54	
56	
63	
64	
72	
81	

Showing Facts beyond 39 - 9
Used in Drill, pages 276 - 296.

Table VI, Section VIII, Part V.

Fowlkes & Goff,
Group VIII, Part V.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
46										
47										
48										
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62										
63										
64										
65										
66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71										
72										
73										
74										
75										
76										
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78										
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94										
95										
96										
97										
98										
99										

Table VII, Section VIII, Part V.

Showing Facts Used in Proving Subtraction, Pages 276 - 296.

Color for Examples, Black

Color for Problems, Red

Group Fowlkes & Goff, Group VIII, Part V.

A

+	0	1	2	3	4	5	6	7	8	9
0	3									
1	2 1	6 1	6 1	6	3 1	1	2	1 1	3	6 3
2		2 1	1	1	1				1	
3			1 1					4 1	2	
4		1 1	1	1			3	1		
5	1					2 1	1 1			1
6					2 1					
7				3 1	1					
8			2 2							1
9		2		1			1	1		

B

+	0	1	2	3	4	5	6	7	8	9
10	4 1									
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Table VIII, Section VIII, Part V.

Facts Used in Carrying in Addition in Multiplication, Pages 276 - 296.

Color for Examples, Black

Group Fowlkes & Goff - Group VIII, Part V.

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	1 2		3			1	1		1	1
1	3	9 4	11 2	13 3	9	5 4	9	7 3	5	4
2	6	5 1	5	1	3 1	2 1	4 1	4	2 3	2
3	1 1	1	3 1	2	3 1	1	5	1	3	2 1
4	1	4 1	1 6	6	4 1	6	2 1		1	
5	1	2 1	1	2	6 1	1	1		3 1	1
6	2	3 2	3 1	1	2 1	1	1		4	
7	1		3	1	3	3 1	2 1	1	1	1
8	5	4 4	5 2	2	3	2		3	2	2
9	5	1			1	2 4	1	1	2	2

+	0	1	2	3	4	5	6	7	8	9
25				1						
26										
27		1	2 2							
28			1 3	1 1		1				
29										
30					1					
31										
32			4	1						
33										
34										
35			3 1		1	1 1	2			
36			1	1	1					
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

B

+	0	1	2	3	4	5	6	7	8	9
10		5 2	1			1 1		1		
11							1			
12		1 2	2							1
13	1 1					1				
14		3 1						1		
15			6 1		1 1					
16		1	1	1 1						
17										
18		4	1		1			2		
19										
20		2	1	3	1					
21		2 3								
22										
23										
24		2	5		1	3				

C

	1	2	3	4	5	6	7	8	9
40			1	2		1	1		
42		1	1 1		1				
45				1	1				
48		1	1	2					
49									
54									
56		1		1					
63		1	1	1				1	
64				1					
72				3	1	3	1	1	
81							1		

Group VIII and Drill

Part VI.

Throughout the book the authors have had certain addition drills that have been directly entitled Addition Practice. Part VI includes all the so-called Addition Practice between pages 297 and 429. It is on only four pages: 338, 350, 410 and 415.

Page 338 has 12 two-place 5 addend columns with zeros, gaps, carrying, and dollars and cents.

Page 350 has 20 single columns of six addends with zeros.

Page 410 has 5 examples of three place numbers with eight addends, zeros, gaps, and carrying.

Page 415 has 5 examples of three-place numbers with eight addends, dollars and cents, gaps, zeros and carrying.

Two tables tell the whole story concerning this group.

Table V-A, Section VIII, Part VI, page.76.shows that:
5 difficult primary facts have received no drill

Table V-B, Section VIII, Part VI, page.76.shows that:
195 decade facts have been used.
0 practice is found in the upper reaches of the useful decade facts.

Table V-C, Section VIII, Part VI, page.76.shows that:
No facts needed for carrying in multiplication have been used in addition

Table VI, Section VIII, Part VI, page..77.shows that:
No facts beyond social and business usage have been used.

Table V, Group VIII, Part VI.

Addition Practice on Pages, 338, 350, 410, 415.

Group Fowlkes & Goff, Group VI.
Pages 338, 350, 410, 415.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	3		1	3	3	2	1	4	4	3
1	1		2	1	1	2	2	2	3	2
2		2	2	6	3	2	4	2	3	1
3	4	15	8	10	5	6	4	1	4	6
4		4	4	3	5	3	3	5	4	1
5	2	4	4	3	4	3	5	4	2	2
6	2	4	4		4	4	2	4	1	4
7	2	5	2	4	1	3	5	4	3	1
8	3	1	3	3	3	4	7	4	7	3
9	3	2	7	3	1	1	6	2	3	2

B

+	0	1	2	3	4	5	6	7	8	9
10		1	4	2	7	3	2	4	1	2
11	2	5	4	3	3	5	2	3	1	6
12	2	2	3	1	4	3	4	9	3	3
13	1	2	5	6	3	3	3	2	3	
14	4	3	3	4	2	6	6	2	2	1
15	2	4	5	4	2	5	2	2	4	3
16		8	2	5	8	3	4		3	2
17	3	3	3	8	7	1	4	2	2	4
18	1	1	2	2	4	2	2	2	2	
19	3	2	5	2	2	4	2	2		2
20	7	4	4	4	4	4	3	1	2	
21	4	1	1	5	4	2	2	2	3	1
22	3		1	2	2	2	1	1	1	2
23	3	2	1	1	1	1	2	2	1	2
24	1	4	3	1	1		1	3	1	1

+	0	1	2	3	4	5	6	7	8	9
25	2	2	3	1	2	3	2		2	1
26	2	3	1			1	1	1	1	1
27		3		4	4	1	1		1	
28	1		3			4		3		
29	1	1	1	3	1	3				
30	1	4	1	2	2	1				
31	1	3	4	2						
32	1	2	2	3						
33	6	2	1							
34	3	2								
35	1	2								
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Showing Facts Beyond 39 + 9
Used on Pages 338, 350, 410, 415.

Table VI, Section VIII, Part VI.

Fowlkes & Goff,
Group VIII, Part VI.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										
89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										

Group VIII and Drill

Part VII

With the exception of the Addition Practice on pages 338, 350, 410 and 415 which were tabulated in Part VI, this group, Part VII, includes all the addition facts found in the text on pages 297 - 429.

Many 2 and 3 step problems are found in this part of the book. In this analysis all addition facts used in multiplication were tabulated on a different sheet from those used in proving subtraction or from those used in addition as such. Therefore the different facts in a single problem may appear in three different tables.

In Table V, Section VIII, Part VII, page 80.

A shows that:
11 primary facts received no drill.
Among them are 0 + 4, 0 + 6, 0 + 8, 0 + 9

B shows that:
95 decade facts below 39 + 9 have been used.
18 decade facts below 39 + 9 have been taught.

C shows that:
4 facts needed for carrying in multiplication have been used.
2 facts needed for carrying in multiplication have been taught.

Table VI, Section VIII, Part VII, page 81 shows that:
14 higher decade facts beyond 39 - 9 have been used.
These facts are beyond social and business usage. For the most part they are to be found in problem 3 page 351 where the children are asked to find out how many dozen eggs Mrs. Smith gathered

In Table VII, Section VIII, Part VII, page 82.:

A shows that:
53 primary facts were used in proving subtraction

B shows that:
3 decade facts below 39 + 9 were used in proving subtraction.

In Table VIII-M, Section VIII, Part VII, page 83.

A shows that:
61 primary facts were used in carrying in multiplication

B shows that:
35 decade facts below 39 + 9 were used in carrying in multiplication.

C shows that:
14 higher decade facts were used in carrying in multiplication.

In Table VIII-D, Section VIII, Part VII, page 84.

A shows that:
74 primary facts were used in multiplication in division examples.

B shows that:
54 decade facts have been used in multiplication as it occurs in division.

C shows that:
29 higher decade facts have been used in multiplication as found in division.

In Table IX, Section VIII, Part VII, page 85.

A shows that:
46 primary facts have been used in adding mixed numbers.

B shows that:
38 decade facts have been used in adding mixed numbers.

Table V, Section VIII, Part VII.

Addition Facts Used on Pages 297 - 429 (with exception of pages 338,350,410,415).

Color for Examples, Black

Group Fowlkes & Goff, Group VIII, Part VII.

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	2	1	1 2	1		2 1		2		
1	2 3	4 24	7 5	6	5 1	3 2	1 2	5 2	1 3	4
2	1 2	1 21	3 1	3 3	5 4	6	1 1	1	2 1	1 1
3	1	2 8	1	5 5	2 2	1	1 1	·2	1	1
4	2	2 6	2 2		1 2	1 2	1 1	2 4		
5	1 7	2 3	3 2	4	2 1	2 3	1 2	1	3 1	1
6	2	2 6	3 7	3	3 2	2	2	5 1	3	1
7	4	1	1 3	1 2		1 1	3		2	3
8	3	1 5	4	1	1	1 3	3 4	1 1		2 3
9	2	1 4	2	3 1	1	5		1	1	2

+	0	1	2	3	4	5	6	7	8	9
25						1	1		1	
26					1		1	1 1		
27			1	1						
28					1		1			1
29										
30		1	1				1			
31							1			
32								1		
33								1		2
34										1
35										
36										
37				2						
38										
39										1
	0	1	2	3	4	5	6	7	8	9

B

+	0	1	2	3	4	5	6	7	8	9
10	1 4	2	3	1	1 4	1 1		1	1	
11	1	1	1	3		1	1	1	1	2
12	1		1	1		1	1		1 2	1
13			2	2 1	1			1		4
14		1	1	4 1	1 1	3				1
15	2		1 1		1	2			1	2
16			1	2						
17		1		1	1	2 2	1	1	1	
18				1		1	2	1 1		2
19							1	1		
20	3	1	1				2		1	
21				1						1
22				1	1 1	2 1				
23				1	1					
24	1		1				1			

C

	1	2	3	4	5	6	7	8	9
40						1			
42									
45									
48									
49									
54					1				
56							1		
63								1	
64									
72									
81									

Showing Facts beyond 39 + 9
Used in Addition on pages 297-429.

Table ~~VI, Section VIII~~, Part VII.

Fowlkes & Goff,
Group VIII, Part VII.

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42									1	1
43										
44										
45										
46							1			
47										
48									1	
49										
50			1						1	
51										
52				1					1	
53										
54										
55										
56										
57										
58										1
59										
60							1			
61										
62										
63										
64										
65										
66							1			
67									1	
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71								1		
72										
73										
74										
75										1
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										
89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										

Table VII, Section VIII, Part VII.

Addition Used to Prove Subtraction, Pages 297 - 429.

Color for Examples, Black

Group Fowlkes & Goff, Group VIII, Part VII.

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	5	2			1	2		1 1		1
1	1	4	2 6	2 2	1 2	2 1	2 2	2	4 4	8 2
2	1		1	3	2	1	2	1	1 1	
3		1	1		1	1 2		3	1	1
4	1	2 1					1 1			
5	3	2	3			8		1 1		
6							1	1		
7				2		1	1			1
8		1	1 1		1 2	2	1 2			
9		1 3						1	1	

B

+	0	1	2	3	4	5	6	7	8	9
10		1			1			1		
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

+	0	1	2	3	4	5	6	7	8	9
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

Table VIII-M, Section VIII, Part VII.

Addition Facts in Multiplication, Pages 297 - 429.

Group VIII, Part VII, Fowlkes & Goff

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0		3				1			2	
1	2	4 2	7 2	6 3	1 1	1	3 3	2 1	2 2	1 1
2	1	3	4 1		1 1		3		2	
3		2 2			2			2		1
4	1	2 3	4			2	1	1		2
5	1 1	1	1	2		1	1		1	
6	1	3 9	1 5	2			1		2	2
7		1	1			1	2		1	
8	1 1	6 4	6 2	4 2	3 1		1	1		
9		2	1 1		2 1	1			1	

B

+	0	1	2	3	4	5	6	7	8	9
10		1	1			1				
11										
12		1 2	3 3	3	1					
13										
14	1	4 2								
15		3	1	2 2	1					
16			1	1	2			1		
17										
18		1			1					
19										
20										
21			1		1	1				
22										
23										
24		1		1	2	1				

+	0	1	2	3	4	5	6	7	8	9
25								1		
26										
27										
28										
29										
30		1				2				
31										
32			1			1	2 1			
33										
34										
35		1					1			
36							1			
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

	1	2	3	4	5	6	7	8	9
40				1					
42	1		1						
45		1							
48					1				
49		1							
54				1					
56				1 1					
63			2 1		1		1		
64			1						
72	1			1					
81									

Table VIII, D Section VIII, Part VII

Addition Facts Used in Multiplication in Division & Proving Division, Pages 297 - 429

Group VIII, Part VII.

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	3	10	11	3	2	1	1	2		
1	3	6	9	7	8	7	4	4	7	5
2	5	7 2	7	5	3	2 1	3	5	1	3
3	5	8	4	2		3	3		2	
4	2	15 1	3 2	2	1		1			
5	5	2	1	4 2	3	2			1	1
6	7	9	5	3 1	2		1			
7			1			2		1	4	
8	4	10	6	1	1	3	1	1	1	
9	3	3	3	2	2					1

B

+	0	1	2	3	4	5	6	7	8	9
10		7	3	4	2					
11										
12		5	1	4	3 1					
13										
14			3 1							
15		5		1	1					
16		3	7		2			1		
17										
18		5 1		1	1	1	1			
19		1								
20		5	11	6	1					
21	1	4	2				2			
22										
23										
24		10 1	1	4 1	1					

+	0	1	2	3	4	5	6	7	8	9
25		3			1					
26										
27					1			1	2	
28		4		2	1	1				
29										
30		7	6 1	1	3					
31										
32		4				1				
33										
34										
35		2	10	2		1	2		1	
36										
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

	0	1	2	3	4	5	6	7	8
40		5	4		1				
42		2		3	2				
45			3						1
48		2	3	2					
49									
54		3	3		1	1			
56		2	5	3					
63				2	1	2		1	
64		2	2	1					
72		2		1			4	2	
81									

Table IX, Section VIII, Part VII.

Facts Used in Mixed Numbers. Pages 410 - 417.

Fowlkes & Goff
Group VIII, Part VII

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0										
1		12 4	2 1	2 1	2	2 1	1	3	1	1
2		4	1		2	1		1	1	
3		3 2	1	1	2	1	1	1		
4		2 1	1	1		1	1	1		
5		2 1		2 2	1 2					
6		1 1		1 1	4	1 1	1			
7		2 1		1		1	1			
8			1 1		1 1		1		1	
9				1 1	2					

B

+	0	1	2	3	4	5	6	7	8	9
10					1 2					
11				1	1	1	1			
12			1	2		1	1			
13					1		1			
14			2							
15			1					1		
16					1	2				
17					3	1				
18						2				
19						1				
20						1		1		
21						3	1			
22					1	1				
23							1			
24								1		

+	0	1	2	3	4	5	6	7	8	9
25								1		
26							3		1	
27							1			
28										
29								1		
30										
31										
32										1
33									1	
34										1
35										
36										1
37										
38										
39										
	0	1	2	3	4	5	6	7	8	9

C

40									
42									
45									
48									
49									
54									
56									
63									
64									
72									
81									

SUMMARY

Fowlkes - Goff

Table V-A, Section IX, Page 88..

100 primary combinations have been taught
100 primary combinations have been used from 19 to 266 times.

Table V-B, Section IX, Page 88..

18 decade facts have been taught
264 decade facts have been used from 1 to 32 times.

Table V-C, Section IX, Page 88..

2 decade facts needed for carrying in multiplication have been taught.
80 decade facts needed for carrying in multiplication have been used.

Table VI, Section IX, Page 89..

2 facts beyond 39 + 9 not needed for carrying in multiplication have been taught.

22 such facts are used.

TEACHING GROUPS

Table IV, Section IX Summary

* Group Fowlkes & Goff - Summary.

Primary or First Decade Facts

A

0 0	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0
1 1	2 1	3 1	4 1	5 1	6 1	7 1	8 1	9 1	
2 2	3 2	4 2	5 2	6 2	7 2	8 2	9 2		
3 3	4 3	5 3	6 3	7 3	8 3	9 3			
4 4	5 4	6 4	7 4	8 4	9 4				
5 5	6 5	7 5	8 5	9 5					
6 6	7 6	8 6	9 6						
7 7	8 7	9 7							
8 8	9 8								
9 9									

0 1	0 2	0 3	0 4	0 5	0 6	0 7	0 8	0 9
1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	
2 3	2 4	2 5	2 6	2 7	2 8	2 9		
3 4	3 5	3 6	3 7	3 8	3 9			
4 5	4 6	4 7	4 8	4 9				
5 6	5 7	5 8	5 9					
6 7	6 8	6 9						
7 8	7 9							
8 9								

B

+	0	1	2	3	4	5	6	7	8	9
10										
11										
12							6			
13										
14				3		5				
15										
16										
17										
18						5				
19						5		7		
20										
21										
22							6			
23										
24						5		7		
25										
26										
27										
28						5				
29						5		7		
30										
31										
32							6			
33										
34				3		5				
35										
36										
37										
38						5				
39						5		7		

C

+	1	2	3	4	5	6	7	8
40								
42								
45								
48					x			
49					x			
54								
56								
63								
64								
72								
81								

* New group in red,
Cumulative groups in black.

Table V, Section IX

Group Fowlkes & Goff, Summary

Color for Examples, Black

Color for Problems, Red

A

+	0	1	2	3	4	5	6	7	8	9
0	66 23	42 11	43 8	38 3	30 2	29 17	24 2	23 2	21 1	19 1
1	78 16	199 67	160 31	107 16	106 19	75 10	60 16	68 18	76 20	92 12
2	91 6	89 47	93 20	50 15	52 16	34 18	38 10	34 4	30 6	23 2
3	44 4	95 27	64 18	76 7	56 11	42 9	37 7	28 4	28 3	25 2
4	28 4	99 30	80 26	57 10	71 7	41 6	28 4	23 6	18 1	24 1
5	37 29	71 19	58 14	55 21	54 5	49 22	25 7	29 4	30 4	26
6	33 5	79 30	78 25	64 11	31 13	25 5	19 3	26 3	29 2	21 2
7	28 8	48 10	58 11	30 10	26	35 10	22 5	26 1	34 8	24 1
8	37 7	70 28	43 16	40 6	39 6	30 10	29 10	29 6	23 3	27 5
9	35 4	39 9	33 5	29 6	20 4	24 13	32 2	28 4	29 3	26 4

Totals 4686
1065

B

+	0	1	2	3	4	5	6	7	8	9
10	14 5	21 10	12 8	9 3	15 5	20 6	7	12	7 1	6 1
11	4 1	12	6 1	5 3	7	11	5 2	8 2	3 2	8 4
12	4 1	23 9	13 7	14 5	17 3	8	8 3	11	7 3	9 1
13	4 1	4	7 4	11	6 1	6 1	5 1	4 4	4	8
14	12	19 5	8 3	17 1	7 2	10 3	9 1	8	5	7 1
15	4 3	17 3	19 3	9 4	7 2	16 3	7	4 1	6 1	8 4
16	2 1	24 3	15 2	14 2	19 4	7 1	9	4	8 1	7 1
17	2	6	4 2	10 2	10	7 2	9	8 2	7 1	11 1
18	2	20 4	9 1	9 1	12	10	7 3	7 1	9	6
19	4 1	4	7	3	3	6	3	2		3
20	8 3	13 1	18 3	13 1	14	10 1	4 3	1 1	2 1	
21	6	6	6	6 1	5 1	4 1	5	3	3	3 1
22	4	1	2	3 1	4 1	4 1	2	1	1	7
23	4	3	2	2 1	2 1	1	2	2	3	5
24	4	30 2	14 2	9 2	12 1	9 1	2 1	7	3 2	2 1

+	0	1	2	3	4	5	6	7	8	9
25	4	7	5 1	4 1	6	9 1	3 1	1 1	5 1	4
26	3	3	1		 1	1 1	1 1	2 1	2 1	5
27		6	2	3	6 1	4 1	1 1	3	5	4
28	1	8 1	8 1	2	4	7	 1	4		 1
29	1	2	2	3	2	3 1			1	
30	1	13 1	12 1	5	11	8 1	2			
31	1	3	4	2		1	 1			2
32	1	10	4	4	4	2 1	4 1	1 1		2 1
33	6	2	1					 1	 1	3 2
34	4	3	1	1	1	2	 1			1 1
35	1	5	12 1	3	6	4 1	6		1	2
36		4	3 1	3	3	4	4	2	2	2
37				 2		1		1	1	1
38			1		1	1		1		
39		1	1	2	1	1	1	1		 1
	0	1	2	3	4	5	6	7	8	9

Totals 1503
248

C

40		9	6	2	5 1	2	1 2	2	
42		6	5	9 1	7	6	3		
45		5	4 1	1	3	5	1	1	3
48		6	6	5	10	5 1	2	2	
49		1	4	2	3	2	2		
54		6	5	2	7	4 1	1	1	2
56		3	8 1	4	4 1	4	2	1 1	
63		3	3	8 1	5	6	1	3	2 1
64		4	3	2 1	2	1	1	1	
72		5	3	2	8 1	3	9	7	3
81		2	2 1	2	2 1	2	2	3	2

Totals
292
16

Fowlkes & Goff Summary

+	0	1	2	3	4	5	6	7	8	9
40										
41										
42									1	1
43										
44	1	1	2	3	1	1				
45										
46							1			
47						1			1	
48									1	
49										
50			1						1	
51										
52				1					1	
53										
54										
55										
56										
57										
58										1
59										
60							1			
61										
62										
63										
64										
65										
66							1			
67									1	
68										
69										

+	0	1	2	3	4	5	6	7	8	9
70										
71								1		
72										
73										
74										
75										1
76										
77										
78										
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SUMMARY.

In its attempt to preserve sequence, to stress checking, and to keep within the bounds of social and business usage, the Fowlkes & Goff book is a step in the right direction.

No one can better appreciate the many problems confronting the author of a drill service than he who has endeavored to analyze such a service.

But to grade three must fall at least the lion's share of drill in the basic facts and even the casual reader of this text must be struck with the rapidity with which each of the five groups of primary facts succeeds the other with no drill material whatever provided or at best with an amount that is entirely inadequate.

As the tables show, the decade work is even less systematized or adequately taken care of in drills.

In the preface of the book, among others the following claims are made:

> "It is complete as to number combinations.
>
> Special emphasis has been given to the zero concept as it appears in daily life.
>
> The zero difficulties have been isolated and grouped.
>
> By means of very thorough and exhaustive chapter reviews, coupled with a self-diagnostic technique addressed directly to the pupil, practical provision is made for individual differences.
>
> The problems contain number combinations which have been carefully selected with relation to drill needs."

Yet analysis shows that only 120 of the 480 facts have been taught, 444 of these facts have been used.

In the primary combinations the zero difficulties have been isolated and grouped but even so they are to be listed among the facts receiving the least practice as may be seen on the summary table.

As shown in the analysis, reviews can scarcely be called exhaustive nor do the

problems make a good showing.

We are forced to agree with Thorndike when he says:

"In general it is a fact that we use the textbooks in Arithmetic with very vague and erroneous ideas of what is in them and think they give more practice than they do."

Comparing this book with those analyzed by Mr. Barclay we find that it is in many respects an improvement over some of them.

Comparative Summary Table

Worthy Points	Iroquois	100% Accuracy	Strayer-Upton	Fowlkes & Goff
Primary facts taught	94	100	100	100
Primary facts used	100	100	100	100
Decade facts to 39 + 9 taught	8	300	0	18
Decade facts to 39 + 9 used	126	300	197	264
Multiplication facts above 39 + 9 taught	0	80	0	2
Multiplication facts above 39 + 9 used	60	80	45	80
Facts beyond social usage taught	0	0	0	2
Facts beyond social usage used	92	0	214	22
Number of teaching groups	12	10	3	8

Another interesting comparison that may be made in summarizing these drill services is the method in which the authors endeavor to teach the various combinations.

The Iroquois drill service teaches the combinations in twelve groups as follows:

Group 1 - Nine combinations whose sums are 10. Eight related decade facts.

Group 2 - Nine primary doubles.

Group 3 - Ten combinations whose sums are nine.

Group 4 - Combinations whose sums are eight.

Group 5 - Primary combinations whose sums are 7 or 17.

Group 6 - Primary combinations whose sums are 6 or 16, 5 or 15, 4 or 14, 3 or 13, 2 or 12, 1 or 11.

Group 7 - Review of combinations whose sums are 6 or 16.

Group 8 - Review of combinations whose sums are 5 or 15.

Group 9 - Review of combinations whose sums are 4 or 14.

Group 10- Review of combinations whose sums are 3 or 13.

Group 11- Review of combinations whose sums are 2 or 12.

Group 12- Review of combinations whose sums are 1 or 11.

The Wilson drill service teaches the combinations in ten groups each consisting of five facts with their reverses. From the very beginning some of the more difficult combinations are included in order that they may receive greater emphasis. Each group contains the useful related decade facts.

The Strayer-Upton drill service presents the combinations in three groups; the first of which contains fifty combinations which the authors believe have been taught in grades one and two. The second group contains twenty five of the remaining combinations. The third group contains the remaining twenty-five combinations.

The Fowlkes and Goff Arithmetic teaches the combinations in 8 groups as follows:

Group I - 25 primary facts whose sums are less than 10, no zero combinations used.

Group II - 16 reverses of the facts in Group I.

Group III - 25 facts whose sums are 10 to 18.

Group IV - 20 reverses of the combinations in Group III.

Group V - 19 zero facts.

Group VI - Review of the 100 primary facts.

Group VII - 9 easy decade facts.

Group VIII- 9 difficult decade facts. 2 facts needed for carrying in multiplication.

The ideal drill service is a difficult undertaking. It is not likely to be constructed by an author who is apparently unconscious of any set requirements.

Perhaps the time is not far distant when an author will feel the need not only of giving evidence that he knows what these requirements are but that furthermore he has followed them in the construction of his drill service.

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